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Agricultural Memorandum No 1004

THE RELATIONSHIP BETWEEN JANUARY MEAN TEMPERATURE AND THE MEDIAN DATE WHEN T-200 IS REACHED

INTRODUCTION

A map showing the median data when T-200 is reached in various parts of England and Wales was required for an ADAS demonstration. To avoid the need for extensive computation of T-Sums a relationship with mean January temperature was sought so that the required map could be based on an existing map of mean January temperature at sea level.

DATA, METHOD AND RESULTS

In Agricultural Memorandum No 876 Roy, Barrie and D'Costa give median dates at which T-200 was reached at 24 observing stations in the UK. The relationship between these dates and 1941-70 average January temperature is non linear but if the T-200 date is expressed as D (the number of days from the start of the year) then $200/D$ is linearly related to mean January temperature as shown in figure 1. The regression equation fitted to the points in figure 1 can be re-arranged to give:-

$$D = 200 / (0.78 T + 1.65) \text{ ----- } (1)$$

The curve represented by this equation is shown in figure 2 together with the data points. The RMS error of the points about the fitted line is only 1.7 days. The points with the largest deviation are the one marked S which is for Santon Downham, a well known first hollow and the one marked W which is for Wick, a coastal station in the far north of Scotland.

The map in figure 3 shows the median date at which T-200 is reached at mean sea level (MSL). It was produced from the published map of 1941-70 mean January temperature at MSL by re-labelling the isotherms as dates using the relationship shown in figure 2.

The non-linear relationship between mean temperature and the date that T-200 is reached implies that the altitude correction to that date is also non-linear and in addition depends on the median data at MSL. Equation 1 was used with a rate of change of temperature of 0.6°C per 100 m to calculate the number of days that must be added to the MSL date to obtain an estimate of the date that T-200 is reached at higher altitudes. The results of these calculations are given in Table 1.

DISCUSSION

The close relationship between the median date of T-200 and the mean January temperature allows the median date of T-200 to be estimated with an error of less than 3 days for most sites. The estimate is less reliable when the calculated date is after 3 March because that is outside the range of the data used to establish the relationship.

All the relationships used in this paper apply only to long-term means they must not be used with data for individual years.

Any comments or suggestions on this paper should be sent to the author.

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Both this paper and Agricultural Memorandum No 993 deal only with the meteorological aspects of T-Sum they should not be taken as an endorsement of the utility of the T-Sum concept in practical farming.

FIGURE 1

$\frac{200}{D} \text{ v MEAN JANUARY TEMPERATURE}$

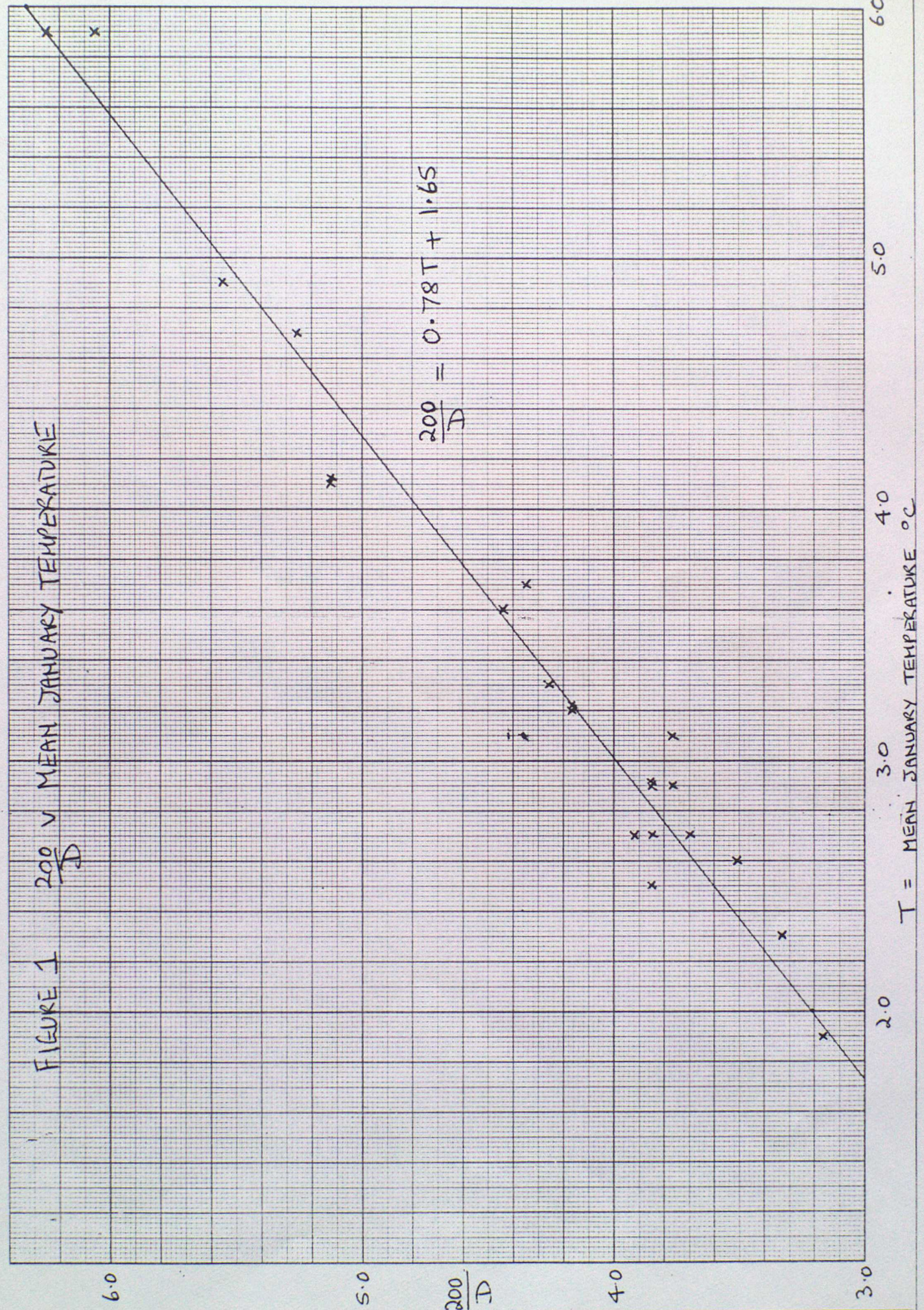


FIGURE 2 DATE OF T-200 V MEAN JANUARY TEMPERATURE

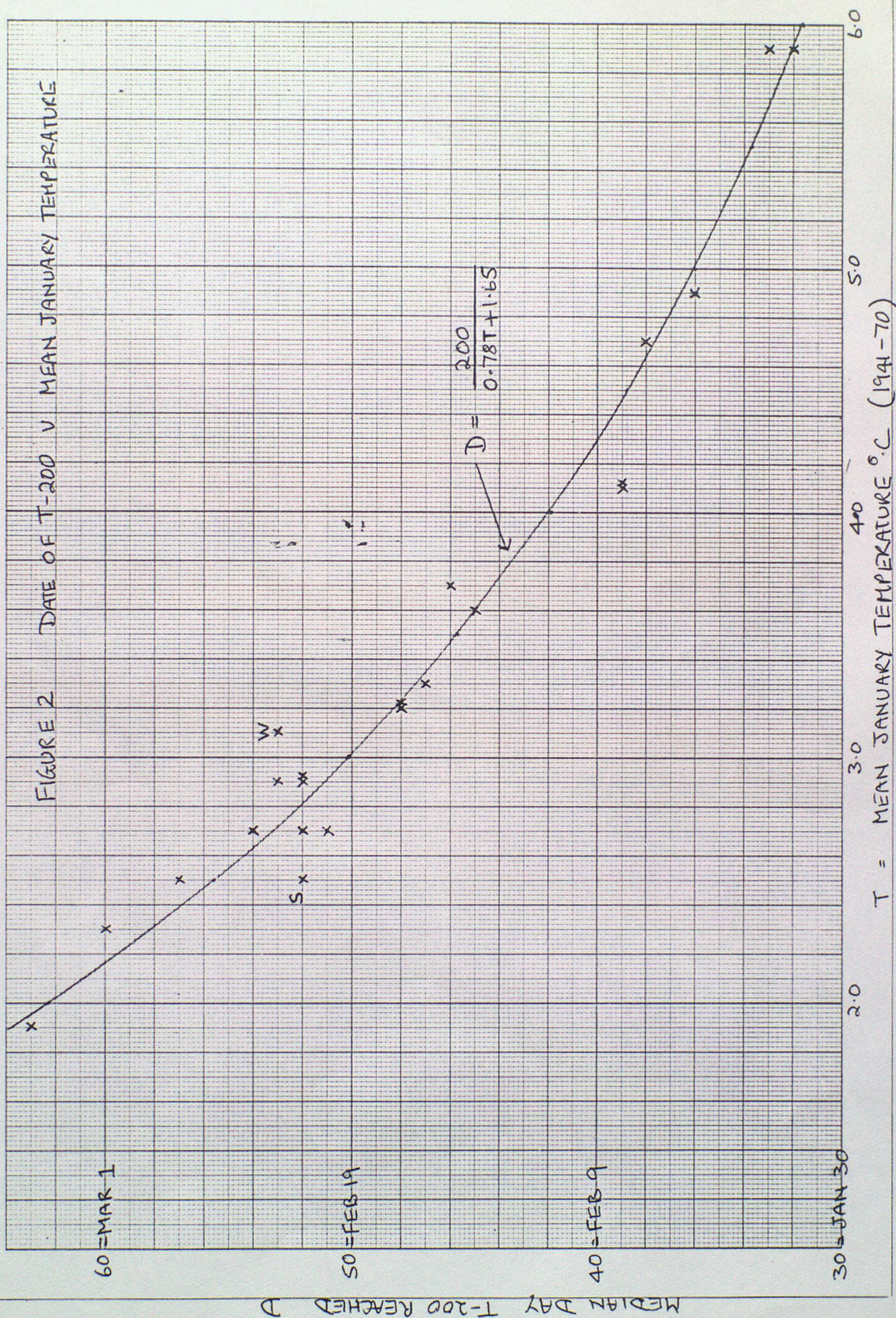


Figure 3

MEDIAN DATE OF T-200 AT SEA LEVEL

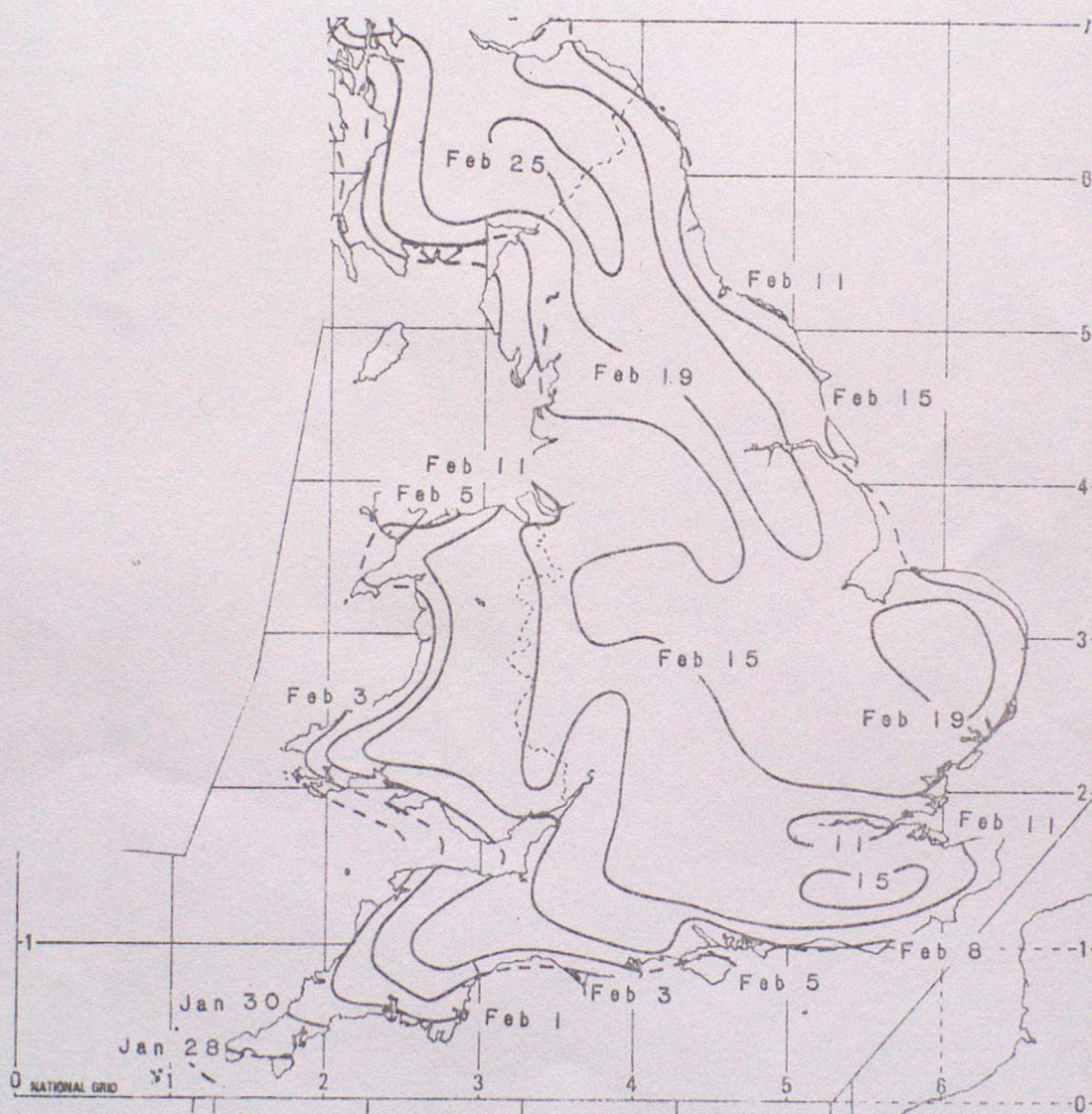


TABLE 1

NUMBER OF DAYS DELAY IN REACHING T-200 AT ALTITUDE

ALT ! (m) !	DATE OF T-200 AT MEAN SEA LEVEL						
	Jan26	Jan31	Feb05	Feb10	Feb15	Feb20	Feb25
20 !	0	0	1	1	1	1	2
40 !	1	1	1	2	2	3	3
60 !	1	1	2	3	3	4	5
80 !	1	2	3	3	4	5	7
100 !	2	2	3	4	6	7	8
120 !	2	3	4	5	7	9	10
140 !	2	4	5	6	8	10	13
160 !	3	4	6	7	10	12	15
180 !	3	5	6	9	11	14	17
200 !	4	5	7	10	13	16	20
220 !	4	6	8	11	14	18	23
240 !	4	7	9	12	16	20	26
260 !	5	7	10	14	18	23	29
280 !	5	8	11	15	20	26	33
300 !	6	9	12	17	22	28	36
320 !	6	9	13	18	24	32	41
340 !	7	10	14	20	27	35	45
360 !	7	11	16	22	29	38	50
380 !	8	12	17	24	32	42	56
400 !	8	13	18	26	35	47	62
420 !	9	14	20	28	38	51	69
440 !	9	15	21	30	41	56	76
460 !	10	16	23	32	45	62	85
480 !	11	17	25	35	49	68	95
500 !	11	18	26	38	54	76	107